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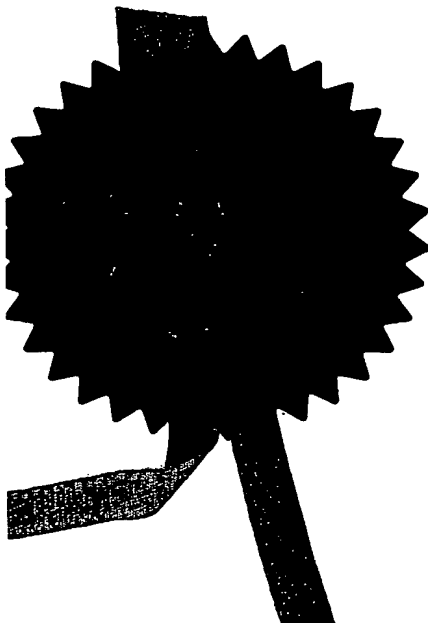
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P. Mahoney

Signed

Dated 17 December 2004



GB0327864.5

By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of:-

BIOFUTURES PI LIMITED
Incorporated in the United Kingdom
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ADP No. 08854671001



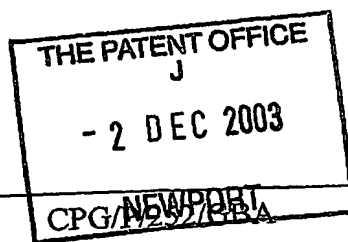
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P01/7700 0.00-0327864.5

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1. Your reference

2. Patent application number
(The Patent Office will fill in this part)

0327864.5

- 2 DEC 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

David MARKS
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BioSciences Building
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United Kingdom

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

SECTION 30(1) APPLICATION FILED 25-6-4

876375001

4. Title of the invention

Pesticidal Composition

5. Name of your agent (if you have one)

Carol P. Greaves et al.

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

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GB

Patents ADP number (if you know it)

7885908002

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Country	Priority application number (if you know it)	Date of filing (day / month / year)
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing (day / month / year)
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

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 - b) there is an inventor who is not named as an applicant, or
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Description

8

Claim(s)

3

Abstract

1

Drawing(s)

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Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

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I/We request the grant of a patent on the basis of this application.

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Carol Greaves 01934 745880

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Pesticidal Composition

The present invention relates to pesticidal compositions, in particular to compositions that control insect or arachnid pests
 5 such as sucking insects, like aphids and their use, especially in agriculture. Certain compositions of the invention may also control the viruses that are vectored by these pests.

A number of natural oils, such as tagetes oil and thyme oil have
 10 been demonstrated to have insect repellent properties on several insect species. However, their potential for use in mainstream agriculture is limited due to two factors: economics and taint. Generally speaking, these oils, when applied alone to crops, have to be applied in amounts of from 2 to 5 litres of oil per
 15 hectare to achieve reasonable pest control. The use of the oils requires too much material to be used for them to be cost effective. Furthermore, when used in these quantities, the crops can suffer significant post harvest taint.

20 Essential oils have been used for the treatment of stored grain, but again, the amounts applied to achieve effective insect repellence is high.

The applicants have found however, that when formulated in a
 25 particular way, the amount of these oils needed can be significantly reduced.

According to the present invention there is provide a pesticidal composition comprising (i) one or more essential oils which have
 30 insect repellent or deterrent properties, wherein the total amount of such oil present does not exceed 10%w/w; (ii) an agriculturally acceptable carrier oil and (iii) an emulsifier.

The agriculturally acceptable carrier oil acts as a carrier for
 35 the essential oil, allowing a smaller quantity of the essential

oils to be evenly distributed on the crop, thus improving efficacy and reducing taint.

The composition suitably contains no more than 5%w/w of essential oil, more suitably no more than 3%w/w and preferably no more than 1.5%w/w of essential oil. For instance, the composition may contain no more than 1%w/w essential oil.

Using formulations of this type, effective pest control can be achieved by applying for instance from 1-5 litres per hectare and preferably about 2 litres per hectare of the composition to crops. This represents a significant reduction, for instance a reduction of between one and two orders of magnitude, of the amount of essential oil applied, as compared to the conventional methods of using these active ingredients.

They may also be applied in other environments, for example to stored grain, in order to reduce or eliminate pest damage. In this case, the amount of composition applied will be dependent on factors such as the nature of the grain and the level of the problem, but generally amounts of composition used will be such that the amount of essential oil is less than 0.01ml/100g grain, particularly less than 0.001ml/100g grain, and most particularly less than 0.0001ml/100g grain.

25

In order to achieve this, generally less than 10ml/100g grain, more suitably less than 1 ml/100g grain, and preferably less than 0.1ml/100g grain of the composition are used.

As used herein, the expression "essential oil which has insect repellent or deterrent properties" refers to natural aromatic oils, obtainable from plants, which repel or deter insects, such as aphids. Essential oils that have known deterrent properties include tagetes oil, such as the oil obtainable *Tagetes erecta* and thyme oil, such as the oil obtainable from *Thymus vulgaris*. The oils may be present alone or combinations of different oils

may be included, provided the total essential oil content does not exceed the amounts specified above.

Thus in a particular embodiment, the composition contains a
5 mixture of tagetes oil and thyme oil, in ratios of from 3:1 to 1:3 and preferably about 1:1.

The agriculturally acceptable carrier oil is suitably a vegetable oil such as including canola oil (OSR), sunflower oil,
10 cottonseed oil, palm oil and soybean oil.

The composition of the invention comprises an emulsifier, which may be any known agriculturally acceptable emulsifier. In particular, the emulsifier will comprise a surfactant, typically
15 alkylaryl sulphonates, ethoxylated alcohols, polyalkoxylated butyl ethers, calcium alkyl benzene sulphonates, polyalkylene glycol ethers and butyl polyalkylene oxide block copolymers as are known in the art.

20 Nonyl phenol emulsifiers such as Triton N57™ are particular examples of emulsifiers, which may be used in the compositions of the invention, but natural organic emulsifiers may be preferred, particularly for organic farming applications.

25 The emulsifier is suitably present in an amount which is sufficient to ensure that the composition has the desired miscibility with water. For instance, the emulsifier may be present in amounts of from 1 to 20%w/w, suitably up to 10%w/w and in particular about 6%w/w.

30 In a particular embodiment, the composition of the invention further comprises a compound which remediates symptoms of viral infection. Particular examples of such compounds may be compounds which reduce ethylene production or have antiviral
35 effects.

Ethylene production is increased following infection with many viruses, and application of compounds, which reduce this, can be used to remediate symptoms.

- 5 A particular example of compounds which are known to reduce ethylene production are salicylate compounds such as salicyclic acid or esters thereof, in particular alkyl ester. Examples of alkyl esters include C₁₋₁₀alkyl esters such as methyl salicylate.
- 10 Suitably, the salicylate compound used in the composition is in the form of an essential oil. Examples of essential oils which include salicylic acid or salicylates include wintergreen oil, as well as oils from Chonopodium, Erythroxylum, Eygenia, Gaultheria, Myristica, Syzygium, Xanthophyllum, Cinnamonium,
- 15 Gualtheria, Gossypium and mentha.

For example, Wintergreen oil contains a high proportion of methyl salicylate, and therefore forms a readily useable source of active ingredient, which is readily miscible with the

20 composition.

Plants respond to compound as it volatilises, so a thorough even coverage is essential to the efficacy of this compound if it is to be effective under field conditions. Incorporation into an

25 oil-based formulation of the invention ensures that this occurs.

Alternatively or additionally, the compound used may be used compounds which have antiviral activity and such as jasmonic acid or derivatives thereof. Particular derivatives are alkyl

30 esters such as C₁₋₁₀alkyl esters such as methyl jasmonate.

The composition of the invention need only contain a relatively small amount of such a compound, for example up to 0.1%w/w, and preferably only a trace amount up to 0.005%w/w for instance,

35 0.001%w/w. Where this is administered in the form of an essential oil, the amount of oil added should be sufficient to

ensure that the desired concentration of the active compound is supplied. In this context, oils with relatively high concentrations of the compounds, such as wintergreen oil, may be preferred.

5

In this particular embodiment, the composition can be used as a "one product strategy" for dealing with several separate but related issues. Specifically it can tackle aphids and other sucking insects and the virus that they vector by:

10

- a) Destroying insects already present;
- b) Deterring reinfestation; and
- c) Helping the plant recover from virus

15 Insects already present on treated crops when the composition of the invention is applied are killed by the agriculturally acceptable carrier oil such as the vegetable oil. This acts by suffocation of the insects and has ovicidal properties, and so reduces the sources of inoculums.

20

The presence of the insect repellent or deterrent discourages reinfestation. Furthermore, by including a compound such as methyl salicylate, the composition will remediate any virus which has been vectored by the insects.

25

The combined approach yields better results than using separate materials.

Thus in a further aspect, the invention provides a pesticidal
30 composition comprising (i) one or more essential oils which have insect repellent or deterrent properties; (ii) an agriculturally acceptable carrier oil; (iii) an emulsifier; and (iv) a compound which remediates symptoms of viral infection.

35 Particularly suitable components (i)-(iv) and preferred relative amounts used are as set out above.

Compositions are suitably prepared by mixing the components together in a conventional manner. Suitably, the essential oil(s), the viral symptom remediation component and the
5 emulsifier are added to the agriculturally acceptable carrier oil and mixed with stirring until the components are evenly diluted throughout the composition.

10 The compositions of the invention are suitably diluted in water before application. Thus the compositions described above are generally concentrates.

Thus in a further aspect, the inventions provide a formulation for administration to insect pests or to the environment of the
15 insect pests, the formulation comprising a composition as described above, and water.

The amount of water used will depend upon the particular mode of administration of the pesticidal formulation, and to where it is
20 being applied, for example to crops or to grain stores of the like. This will generally be by means of a sprayer, such as an electrostatic or other conventional sprayer. In general, the final formulation will contain from 10-20% of the composition of the invention and the remainder is water.

25 In yet a further aspect, the invention provides a method for killing or controlling insect pests which method comprises applying to the pests or to the locus thereof, a composition as described above.

30 Suitably, the composition is one that contains a component, which remediates viral infection, and so the treatment provides a combined pesticidal and viral symptom remediation effect.

35 The compositions and methods of the invention can be used to

treat a variety of crops affected by various insects and arachnids, including aphids, thrips, leafhoppers, greenfly, whitefly, and mites.

- 5 The product is suitable for use on most crops, but in particular can be used for the treatment of greenhouse crops, vegetables, and fruit crops.

10 The invention further provides the use of a composition as described above which contain a compound which remediates viral symptoms, as a combined pesticidal/viral symptom remediation composition.

15 Alternatively, the invention provides the use of a composition or a formulation as described above, as an adjuvant for an insecticide or acaricide.

20 In a particular embodiment, the invention provides the use of a composition as described above as an insecticide or acaricide, for administration to crops at a rate of less than 5 litres per hectare, and preferably at no more than 2 litres per hectare.

25 The amount of composition applied in any particular situation will vary depending upon a number of factors such as the nature of the crop, the level of pest infestation etc. Typically however, for use on crops, from 2-5 litres of the composition of the invention before water is added, will be applied per hectare. Thus the amount of essential oil added will generally be from 0.02 to 0.5 litres per hectare. This is significantly
30 lower than conventional methods.

35 The compositions can be used either alone (and in this case, they may be suitable for organic growers) or in conjunction with other insecticides or acaricides. In the latter case, the composition of the invention can lead to an improvement in performance of the other insecticide or acaricide, and thus it

produces an adjuvant effect. It may further reduce application rate and frequency, remediate virus symptom infection and leave a deterrent.

- 5 The invention will now be particularly described by way of example.

Example 1

- 10 The following components were mixed together in the amounts listed:

Component	%w/w of total
Soybean Oil	93.50
Tagetes oil	00.50
Thymus oil	00.50
Wintergreen oil	00.001
Triton N57™	6.00

- 15 The resultant composition can be applied to crops, where it kills pests such as aphids. The residual deterrent or repellent on the crops reduces the incidence of reinfestation. Furthermore, symptoms of any viral infection, caused by the insect vectors, are remediated.

Claims

1. A pesticidal composition comprising (i) one or more essential oils which have insect repellent or deterrent properties, wherein the total amount of such oil present does not exceed 10%w/w; (ii) an agriculturally acceptable carrier oil and (iii) an emulsifier.
2. A pesticidal composition according to claim 1 which further comprises a compound which remediates symptoms of viral infection.
3. A pesticidal composition comprising (i) one or more essential oils which have insect repellent or deterrent properties; (ii) an agriculturally acceptable carrier oil; (iii) an emulsifier; and (iv) a compound which remediates symptoms of viral infection.
4. A composition according to claim 3 which contains no more than 10%w/w of component (i).
5. A composition according to any one of the preceding claims, which comprises no more than 5%w/w of component (i).
6. A composition according to claim 5, which contains no 1.5%w/w of component (i).
7. A composition according to any one of the preceding claims wherein the essential oil of component (i) is selected from tagetes oil or thyme oil, or a mixture thereof.
8. A composition according to claim 7 wherein component (i) comprises a mixture of tagetes oil and thyme oil, in ratios of from 3:1 to 1 : 3.

9. A composition according to any one of the preceding claims wherein component (ii) is selected from canola oil (OSR), sunflower oil, cottonseed oil, palm oil and soybean oil.

5 10. A composition according to any one of the preceding claims wherein the emulsifier is a natural organic emulsifier.

11. A composition according to any one of the preceding claims wherein the component (iii) is present in an amount of from 1 to
10 20%w/w.

12. A composition according to any one of the preceding claims which contains a compound which remediates symptoms of viral infection, and wherein said compound is a compound which reduces
15 ethylene production.

13. A composition according to claim 12 wherein the said compound is salicyclic acid or esters thereof.

20 14. A composition according to claim 13 wherein the said compound is methyl salicylate.

15. A composition according to any one of claims 12 to 14 wherein the said compound is contained within an essential oil.

25

16. A composition according to claim 15 wherein the essential oil is wintergreen oil.

17. A formulation for administration to plants, the formulation
30 comprising a composition as claimed in any one of the preceding claims, and water.

18. A method for killing or controlling insect pests which method comprises applying to the pests or to the locus thereof,
35 a composition as claimed in any one of claims 1 to 16 or a formulation according to claim 17.

19. A method according to claim 18 wherein the composition includes a compound, which remediates viral symptom infection, and so the treatment provides a combined pesticidal and viral symptom remediation effect.

20. A method according to claim 18 or claim 19, wherein the composition or formulation is administered together with another insecticide or acaricide.

10

21. A method according to any one of claims 18 to 20 wherein the composition is applied to a crop in an amount of less than 5 litres per hectare.

22. A method according to claim 21 wherein the composition is applied to a crop in an amount of about 2 litres per hectare.

23. The use of a composition according to any one of claims 2 to 16 as a combined pesticidal/viral symptom remediation composition.

20

24. The use of a composition according to any one of claims 1 to 16 or a formulation according to claim 17 as an adjuvant for an insecticide or acaricide.

25

25. The use of a composition according to any one of claims 1 to 16 as an insecticide or acaricide, for administration to crops at a rate of less than 5 litres per hectare.

Pesticidal Compositions

- A pesticidal composition comprising (i) one or more essential oils which have insect repellent or deterrent properties,
5 wherein the total amount of such oil present does not exceed 10%w/w; (ii) an agriculturally acceptable carrier oil and (iii) an emulsifier. In particular, the composition further comprises a compound, which remediates symptoms of viral infection.
- 10 Use of compositions of this type in agriculture controls pests whilst reducing the amount of essential oil required. Furthermore, a combined effect of controlling insects, preventing reinfestation and viral symptom remediation is obtainable.

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